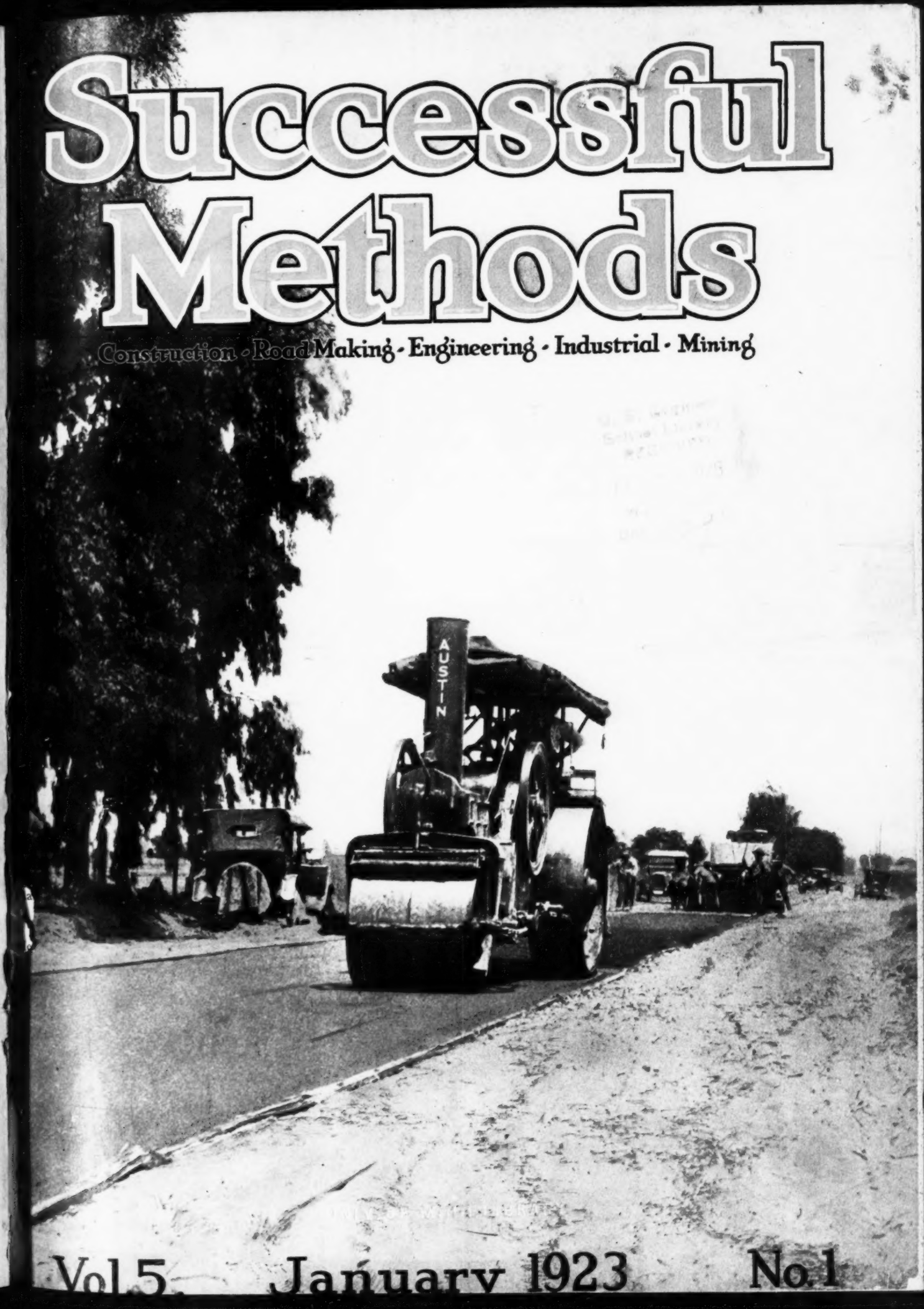
Successful Methods

Construction - Road Making - Engineering - Industrial - Mining



Vol. 5 January 1923 No. 1

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Successful Methods

A Magazine of Construction Service

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Utilizing Local Materials

CAR shortages, embargoes, strikes and delivery delays generally have lost sleep—and dollars—for many a construction man these last six years. Clear back in 1917 we got our first hard jolt along this line with the original open top car order. Since then each season has brought its own special brand of rail transportation trouble. In spite of all this annually recurring experience, the development of local sources of materials has not amounted to much.

In some localities and even in whole states, such as in North Carolina, this statement does not hold. But the possibilities of using local materials have been grasped by only a comparatively few. The experience of these few has been so good, taken as a whole, that the coming season will evidently see a lot of people wake up to the advantage of developing local sources of supply.

It is true that many local materials are expensive to produce. Other local sources are unsatisfactory, without a lot of preparation and special handling. In spite of these handicaps, a dependable local supply is a shot in the locker which will come in most handy when the material deliveries fall down again next summer.

The commercial producers will hardly feel the competition of local production under present conditions. When the edge goes off again, the well-equipped commercial plants will continue more than to hold their own.

Now is the time to think about your own material supply for the coming season. You may have a gold mine in your own back yard. You do not need a geologist to find it. A little keen scouting often results in unearthing a good sand or gravel or stone supply where none has previously been developed. Even what may appear to be a supply of questionable character may often be utilized by a little extra preparation or special care in handling. Standard machinery and equipment may practically always be used. In fact, there are very few problems of producing and handling materials which the manufacturers of machinery and equipment for the purpose have not already solved.

The Common Labor Shortage

IF we spoke as regularly on this subject in a mon ly public meeting as we have in these pages we would likely be forcibly ejected by the slack of our pants. But we are going to risk unpopularity just the same by bringing the subject up again.

Some contractors and engineers are waking up to the fact that there will not be enough common labor to go around. Most construction men are taking, however, the opportunist's course. They either doubt that labor will be scarce this year or they are taking a chance that they will get the men they need anyway.

Even those who have sensed the situation are making few preparations to meet it. Most of them are going to "wait a little while."

Now is the time to get busy. Make plans that will cut down the number of men required. Order your equipment now for later delivery. Get in line for material shipments. Start your backfire while there is still time.

The Two Big Events

THE stage is all set for the two great events of the year in the highway industry—the convention and road show of the American Road Builders Association at Chicago, Jan. 15 to 19.

Never before have similar affairs been so widely heralded. Never before has there been such thorough preparation for the convention program. Never before has there been such a demand for exhibition space at the road show. Never before have so many thousands of highway engineers and contractors planned to attend.

These are truly going to be epochal events. If you have not already planned to go, there is still time to start.

Snow Loading in Detroit

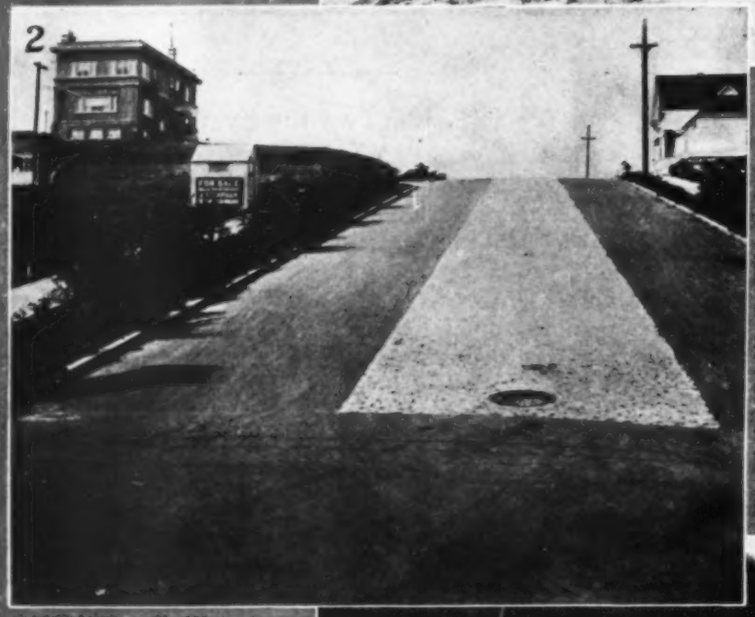
ELSEWHERE in this issue is a story of snow loading in Detroit which includes some records that seem incredible.

Volumes have been written about snow removal. Next to road building, there is no other kind of material handling in which so many pose as experts. Few fields also have been more crowded with freak devices for solving the problem.

Attention has, however, been confined almost entirely to means of pushing the snow to one side; to opening a way for traffic. Mechanical means of loading the snow into carts, wagons or trucks for removal has only recently received serious attention. Now Detroit comes along with an idea for loading that seems to solve that problem most effectively. Anyway, 1500 cu. yd. of snow loaded into trucks by one man in twelve hours is worthy of serious notice.

Carefully Constructed Roads

1—Highway construction in Wyoming. Note the well-equipped road camp on wheels.
© *International*



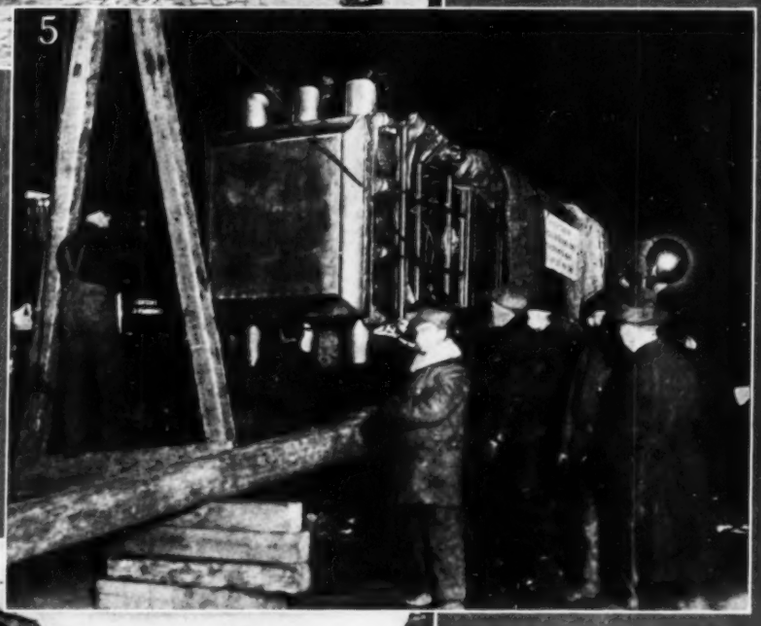
2—Two types of pavement on a single street. San Francisco adopts this method to take care of both automobile and horse-drawn traffic on its steep hills.
© *Keystone*

3—The test road at Arlington, Va., built by the Bureau of Public Roads.
© *Underwood & Underwood*

Must Be Used Efficiently

4—A truck which takes to the street railway tracks when necessary. It is a German invention used in Berlin.

© *Central News*



5—Installing the first of New York City's new traffic control towers at midnight. This one is now in operation at Forty-second Street and Fifth Avenue and will be the main control tower for all of Fifth Avenue.

© *Underwood & Underwood*

6—Clifford Downer, an American Near-East relief worker, is director of highway construction in the Armenian city of Alexandropol.

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GAS ROLLERS MAKE GOOD ON ASPHALT

Speed Up Construction on Paving Job in Fresno County, California

By C. C. Chamberlin

THE term paving contractors does not adequately describe the California Construction Company of San Francisco, Oakland, Fresno and San Diego. Manufacturer is a better word and the company's finished product is asphaltic pavements of all types. No up-to-date manufacturer watches results more closely, or plans for output and low unit costs more carefully. From the rough grading to the final rolling of the finished job, every operation is studied and analyzed to make sure that maximum output is being reached, and that minimum costs are being achieved.

WATERING THE SUBGRADE AND PREPARING IT FOR ROLLING

Under such conditions it follows naturally that the greatest study is given to the machinery used, and when it appears that a new or heavier machine will make a substantial contribution to either of these objectives, that machine is at once put into their service.

One of the most troublesome units of equipment for this class of work is the asphalt heating and mixing plant. Any contractor in this line of work can testify that here is the storm center of most troubles on such work. Yet, it is not unusual for mixing plants operated by this concern

ROUGH GRADING WORK, SHOWING FRESNO SCRAPERS AND HEAVY GRADER IN ACTION

to operate for 28 out of 30 days, including Sundays, without a single shut-down for repairs or because of any other trouble.

The average asphalt-mixing plant is built for temporary use, as it has to be moved from time to time, and too often its period of useful and satisfactory life is less than that of the job for which it was installed. Probably it is safe to say that the average asphalt-mixing plant has a capacity of about 200 tons output per day, while the plants of the California Construction Co. will turn out 400 tons of asphaltic concrete per day of 8 hr. What is more, they do this regularly, and this amount of material is converted into pavement daily.

Perhaps there is nothing startling in the idea of large capacity mixing plants. No doubt other contractors have discovered the fact that the output of their plants is limited by the amount of material that can be spread and rolled in a working day. Engineers usually make specifications which limit the area of new material spread per day, and their specifications are based upon the known limitations of steam rollers to properly roll and compact the mixture. To assure sufficient rolling, this permitted area is so low that large capacity mixing plants are not desirable.

The California Construction Co. was not content to be limited in its output by the limitations of the steam rollers. But it is easily understood that two three-wheeled steam rollers are all that can be used on one section of this work at a time. The limitations of space determine this fact. It is also well known that steam rollers lose a considerable part of each working day while taking fuel and water. This firm realized that if rollers were available that have the ability to roll a greater area in a working day, the output of the entire paving plant and of their organization could be increased by the amount of this greater area that could be rolled.

To get around the limitation imposed by steam rollers, it was decided to try out gas rollers for this work. The only question was to determine whether gas rollers would be sufficiently free from vibration to risk using them on asphaltic concrete work. Wheel marks and depressions left in hot material would be enough to condemn the gas roller, whether these marks were caused by motor vibration when rolling, or when the roller was allowed to stand for any reason on the hot asphalt. For short stops, it is not practical to stop the motor of the gas roller.

A carefully conducted trial, extending over a period of several weeks, proved that the gas roller is adapted to meet the exacting requirements of a three-wheeled roller on asphaltic work. In no way did the gas roller seem inferior to the steam rollers. At the same time, the gas roller demonstrated that it was capable of satisfactorily rolling between 30 and 35 per cent more area per working day. This result made it possible to handle this much more material through the

ROLLING THE SEAL COAT ON ASPHALTIC CONCRETE PAVEMENT. THIS IS THE MOST PARTICULAR PART OF THE JOB AS ANY UNEVENESS IS AT ONCE EVIDENT

GENERAL VIEW OF THE LARGE CAPACITY ASPHALT MIXING PLANT, SHOWING STOCK PILE

mixing plants, with the result that the job was speeded up, the output increased, and unit costs reduced.

After the results of this trial were determined, the California Construction Co. bought four additional gas rollers for other jobs. The economy of these rollers made it profitable to discard the steam rollers which formerly had been used. Several months' experience with the five new gas rollers has confirmed the wisdom of the change, and next season it is intended that all the remaining steam rollers in the company's equipment will be replaced by gas rollers of the same type.

The actual saving in operating costs of the gas rollers over the steam roller costs is a considerable item, but it is a trifle compared to the gain through greater output of the entire plant.

The officers of the California Construction Co. are: C. E. Blanchard, president; A. J. Crocker, vice-president, and Harry Lesser, secretary and treasurer. Their main office is in San Francisco. The photographs were taken on a paving job in Fresno County, California. This work is a part of the $5,000,000 paving program being carried out by Fresno County. All of this pavement is "black base" or asphaltic concrete. The work is being done under the direction of Chris Jensen, county surveyor and highway engineer, and Harry Leyden, superintendent of construction, who are looking after the interests of Fresno County.

NORTH CAROLINA—A LEADER IN ROADBUILDING

IN the last two years North Carolina has made a name for itself in highway construction. The present highway commission went into office on April 1, 1920, and at once began work along really progressive lines. Charles M. Upham, State Highway Engineer of Delaware, who had made an excellent record in that small state, was appointed State Highway Engineer by the new commission, and took hold of the work that spring. At the time the new commission went into office 74 projects were under actual construction, having a total mileage of 167 miles. All of this work was being carried on with the assistance of Federal Aid funds, and at that time the allotment for North Carolina had practically all been expended. No hard surface roads were under construction, and only a few other projects were actually being carried on.

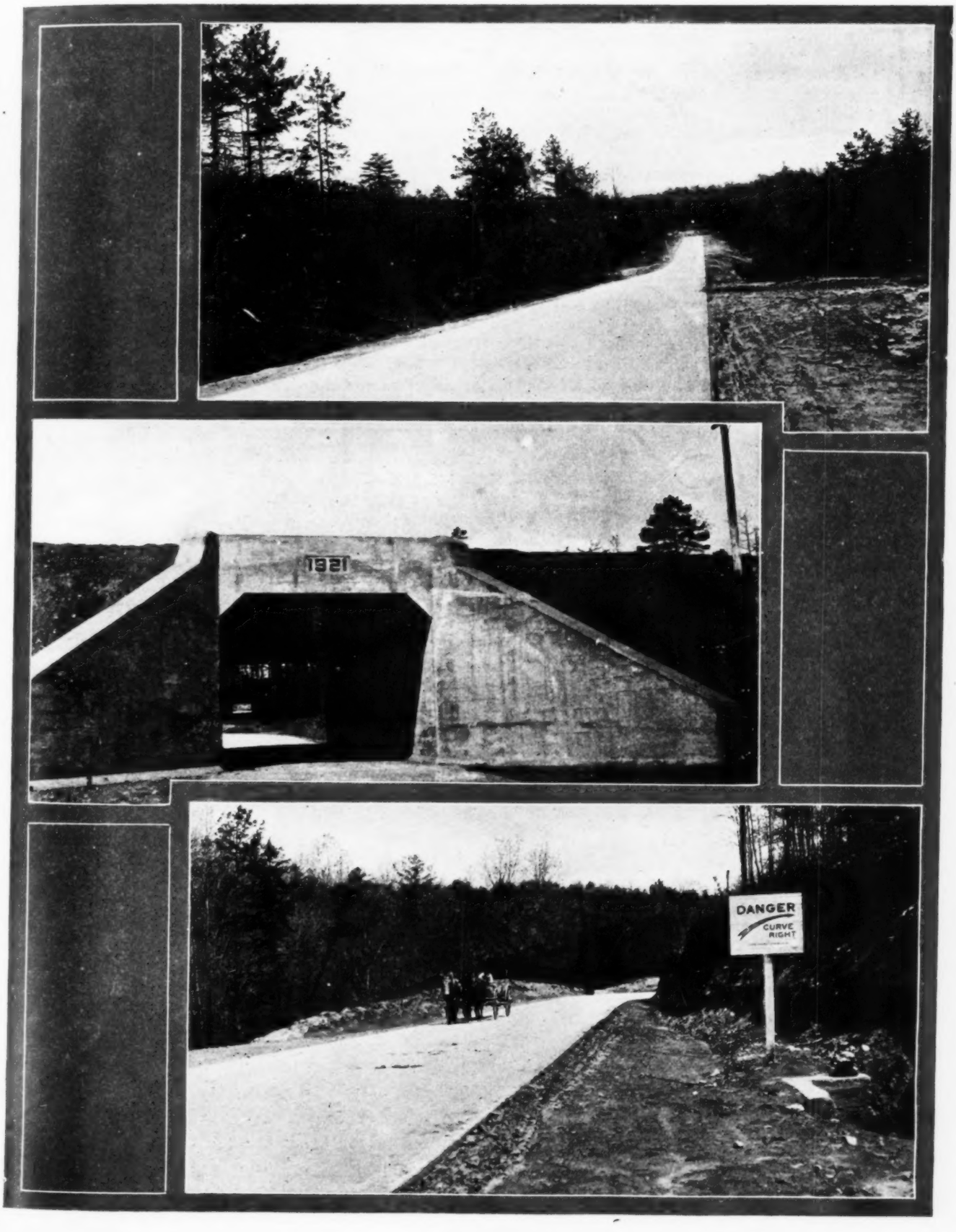
The first month or two were devoted to organization, including the importation of Mr. Upham, and it was not until July 1 that the actual construction work was in full swing. By April, 1922, when the commission had completed its first year in office, the work handled had increased from $12,800,000 to almost $31,000,000. At the date mentioned there were under actual construction 119 projects totaling 1,029.27 miles, and the estimated cost was $15,300,000. Approximately one-fourth of this mileage, or 231 miles, are of hard surface roads, costing about $7,700,000. The remainder, or about 800 miles, are of top soil, sand, clay or gravel. Eight bridges also were under way at that time, costing about $508,000.

In the December issue of Successful Methods appeared a statement from Mr. Upham showing that since July 1, 1922, 2,000 miles of highways have been put under construction in North Carolina. Of this, about 800 miles have been completed, leaving about 1,200 miles of all classes of construction which will be carried over into 1923. In addition, during 1923 approximately 800 to 1,000 miles of new construction will be added to the program.

The photographs on the opposite page show the sort of work which North Carolina is doing. The upper photograph shows a typical section of concrete road 18 feet wide. The center photograph shows the type of underpass which has been constructed, and the lower picture shows how carefully North Carolina is marking the danger points along its new roads.

The members of the Commission are: Frank Page, Chairman; J. E. Cameron, J. G. Stikeleather, W. A. Hart, W. A. McGirt, John Sprunt Hill, J. Elwood Cox, W. C. Wilkinson, R. A. Doughton and John C. McBee.

North Carolina Road Construction



LOADING 1500 CUBIC YARDS OF SNOW IN TWELVE HOURS IN DETROIT

Work Done by Full-Circle-Swing Crane Mounted on Motor Truck and Equipped with Special Clamshell Bucket

AFTER a recent heavy snowstorm in Detroit a full-circle-swing crane, mounted on a motor truck and equipped with a special clamshell bucket, was used very effectively in loading snow from piles on the streets into motor trucks. Accurate records of the amount of snow handled by the outfit were not available when these notes were written. From observations made while the work was in progress, however, it is possible to give a general idea of the methods used and of the results secured.

The crane mounted on the truck was one of a fleet of units of this type operated in Detroit and vicinity by the Coffman Crane Service Co. The regular business of this concern is the loading and unloading of bulk materials to and from railroad cars. They also handle such materials generally and do all kinds of heavy lifting. With their cranes mounted on motor trucks they can shift these units rapidly over a large area. They can also afford to make a move to handle a comparatively small amount of material or even to make a single lift.

The recent big snow in Detroit occurred during the night. At 7 o'clock the next morning the company was called upon to furnish a crane to try out the special bucket for loading snow in the business district. They started a crane from a point 4½ miles from the location of the job. The outfit had to stop enroute to pick up the bucket and reeve it for operation. This was done and the crane was on the job ready to operate in about an hour from the time the call was made for it.

Meanwhile the snow had been piled and winrowed along the downtown streets by machines and by hand.

MOVING SNOW IN CADILLAC SQUARE, DETROIT, AT RATE OF 125 CU. YD. PER HOUR

The crane loaded from these piles and winrows directly into the motor trucks. Enough trucks were provided so that the crane never had to wait—one of the first essentials of successful dirt moving.

The crane worked at first in Cadillac Square, from which the principal streets of the city radiate. The automobile traffic here is very dense. Double-track street car lines, with overhead trolley wires and carrying the main routes of the city, also cross this square. All this congested traffic was badly hindered by the heavy snow.

Working under these conditions the crane equipped with the special bucket for handling snow cleaned up all the snow in Cadillac Square in about two hours. The unit was then used in the principal adjacent streets until the bulk of the snow was out of the way.

Between noon and midnight of one day the crane loaded more than 300 motor trucks. These trucks were all of 5 cu. yd. capacity, or larger. Some of them were fitted with sideboards. It seems safe to say, therefore, that the unit picked up and placed in the trucks more than 1500 cu. yd. in 12 hr., or at an average rate of 125 cu. yd. an hour. It was expected when the official records could be checked up that they would show much more than this.

The clamshell bucket, with which the crane was equipped, was designed specially for snow handling. It has a struck-measure capacity of 1½ cu. yd. and weighs only about 2000 lb. It frequently picked up 2 cu. yd. at a time, due to the surcharge possible in handling snow.

No damage whatever was done to the sheet asphalt pavements on which the crane unit was used. The crane was under such perfect control at all times that the operator could avoid dropping the bucket on the pavement. The design of the bucket also enabled him to take the snow quite clean without marring the pavement surface.

The bucket was full reeved, because it had never been used to dig and load snow before and there was no way of knowing exactly how much power would be required. Experience showed that one less reeving would have been enough. With one less reeving the speed of the bucket would have been increased about 25 per cent.

On the streets away from Cadillac Square the unit was used mainly to remove the piled snow. No special effort was made to take the piles absolutely clean. The idea was to get the main mass of snow away so as to avoid a traffic tie-up in case of another snow. The small amount of loose snow left by the bucket when worked under pressure this way was repiled by machines and removed later. Only three or four second piles were thus left to every 300-ft. block to be loaded later. The main streets were in this way quickly freed of snow.

The motor truck carrying the crane was manipulated around in the dense traffic without any trouble whatever. The trucks also could be spotted quickly for a load almost without any interference with traffic. The crane boom was handled without hindrance from the trolley wires.

After finishing on the snow work at 3 a. m., the crane unit was equipped with a standard ½-yd. clamshell bucket and put back at work at 7 a. m., unloading coke from railroad cars.

The demonstration of the great possibilities of removing snow from city streets with the special bucket handled by a full-circle-swing crane mounted on a motor truck was made under the direction of Commissioner of Public Works Martin and Commissioner of Streets Knight of Detroit.

WINTER WORK IS PROFITABLE

CONTRACTORS, generally speaking, have regarded the winter months as a period of inaction when work could not be done to advantage. In the past, before labor complications and transportation problems became so acute, there was no doubt a good reason for this belief. However, conditions have changed, and a visit to any one of the many jobs which are now going on, regardless of freezing conditions, will convince the most skeptical that it is not only possible but often highly desirous to carry on during the winter.

First of all, labor is more plentiful and more willing to work. Material can generally be figured on as at least ten per cent cheaper than in the height of the summer season. Cars for the transportation of materials are more plentiful, which make material deliveries more satisfactory, and a contractor is able to keep his organization together. To offset these advantages there is the necessity of heating materials and protecting against the cold, but numerous ingenious methods have been put into practice, so that now most progressive contractors figure it is to their advantage to work right on through the winter. Some of the things to do and not to do follow.

On concrete work, the water and aggregates must be heated so that when placed it will have a temperature of not less than 70 degrees. Place the concrete in forms immediately after mixing so that none of its heat will be lost. Canvas covering, sheathing or a layer of straw will furnish sufficient protection for some work. Where work can be inclosed, steam coils, open coke stoves or salamanders may be used. In severe weather such protection should be continued for at least five days. Be sure concrete is strong enough to bear the load before supporting forms and shores are removed.

For heating the aggregate a number of methods are satisfactory. A kerosene heater which attaches to the mixer throws a live pressure flame into the drum of the mixer and heats the aggregate while mixing. On a one bag mixer, a 12 gallon tank which burns 2 gallons of kerosene per hour is used. The heating apparatus is detachable, and can be used for thawing out material piles, etc.

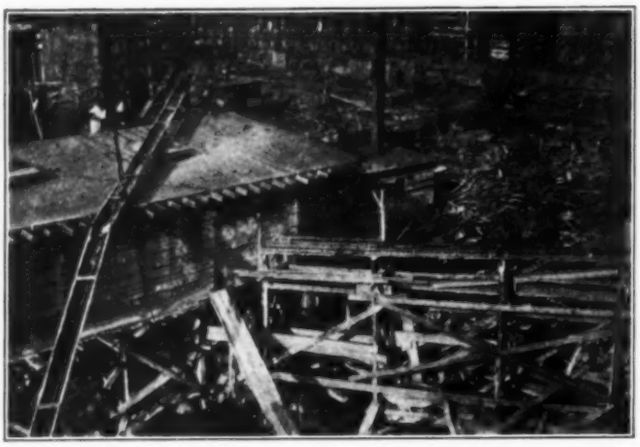
Short pieces project into the bin. The end of the 3 inch main is fitted with a valve and hose connection so that live steam may be carried a considerable distance for such work as thawing material piles, ice from forms and blowing refuse from beam bottom forms.

SOME CORNERS OF CHICAGO'S NEW UNION STATION

A Few of the Methods by Which Contractors Are Saving Time and Money

By Robert S. Arthur

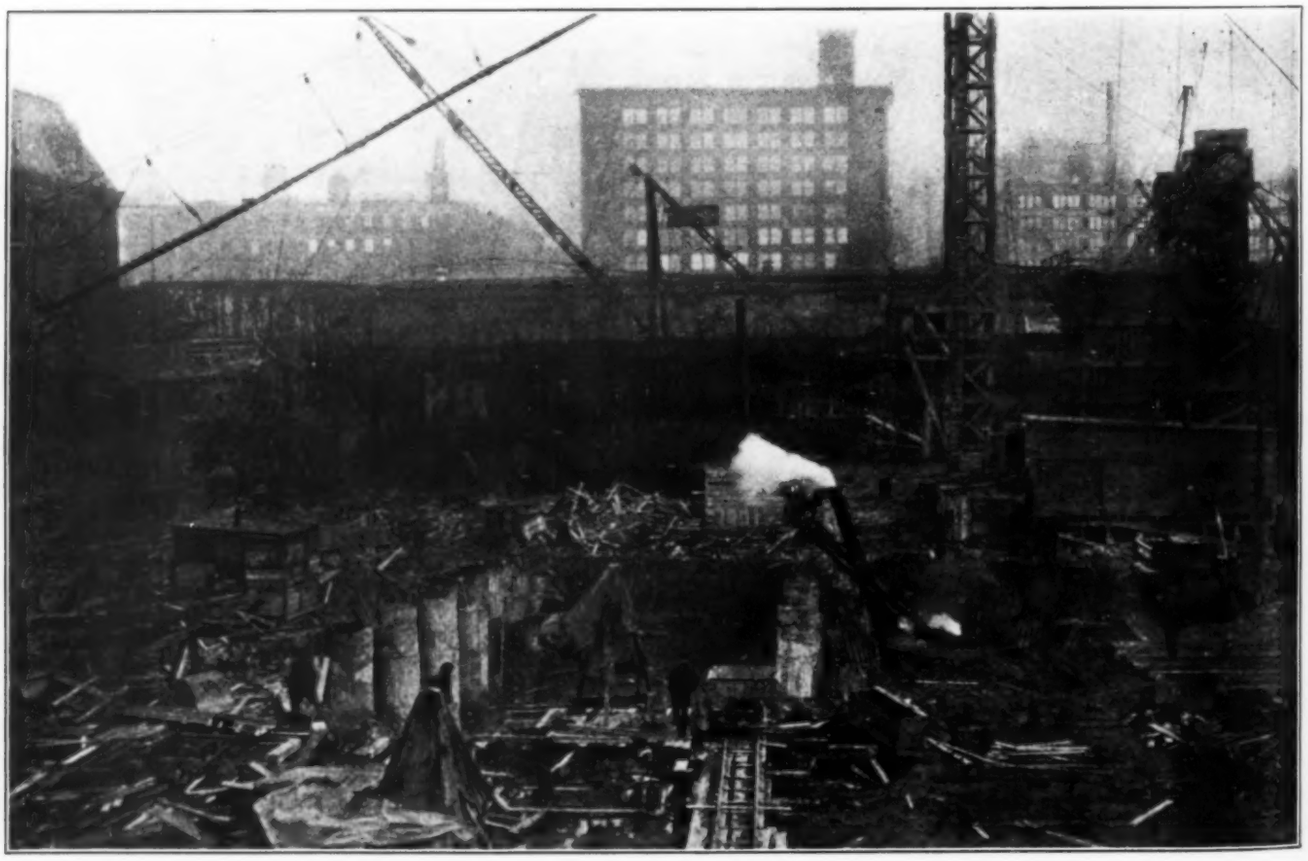
CHICAGO'S great new Union Station—a wonderful engineering and architectural enterprise—is now, after a delay of years, on its way to completion. Work on various parts of the project, including extensive street alterations and viaduct approaches to river bridges, has been in progress for the last few years. An idea of the size of the project can be gained from the fact that in addition to the train shed, concourse and station, which cover an area one block wide by three blocks long, the head-house, surmounted by a twenty-story office building, occupies an entire block on the west. Immediately to the south will be located the new United States Railway Mail Terminal now under construction. The Chicago & Alton Railroad has recently completed its freight station and office building south of the new station, while on the west, occupying a full block north of the head-house, is the site of the proposed new Post Office. All these will be connected by passageways and tunnels. With the completion of this vast project, the old Chicago Union Station, with its awkward approaches, grades, structures and stairways, will be superseded by a modern terminal second to none.



CEMENT HOUSE AND GRAVITY ROLLER CONVEYOR WHICH KEEPS SUPPLY CONSTANT

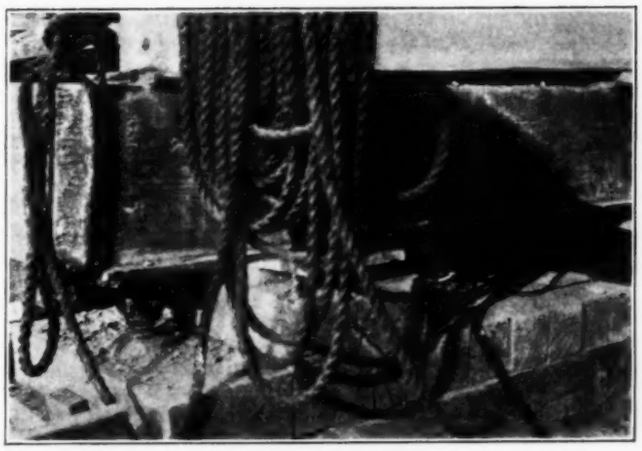
The photographs on these pages, which were taken recently, show some of the methods used in the construction of the station proper and indicate the ingenuity which the contractor exercised to meet the special conditions.

Inasmuch as the site was filled in at various times, the supporting of even temporary structures, such as bins, was precarious. One of the illustrations shows a close-up of one of the 36 jacks on which the 300-yd.



A GENERAL VIEW OF THE BIG EXCAVATION FOR THE STATION

material bin rests. From time to time, level readings are taken on the sills and the bin is kept plumb by means of the jacks. While jacks are employed in many instances under permanent buildings, the use of them on temporary work is unusual, but in this case they are serving their purpose well and save considerable time and worry.



JACK SUPPORTING BIN.

A comprehensive system of steam pipes furnishes live steam from a separate boiler plant, and steam is delivered at 120-lb. pressure, which is used for cleaning beam form bottoms as well as for heating materials in the main bin. A 3-in. main enters the bin just below the floor-line. From this main extend three 1½-in. laterals at right angles, and from them ¾-in. pipes project about 8 in. through the floor at frequent intervals. From the end of the 3-in. main there is a 2-in. line with valve and hose connections which furnishes steam for cleaning purposes as described above, or for odd melting and thawing jobs.

One of the illustrations shows the cement storage house and the conveyor used to carry cement from cars a distance of about 200 ft. A gravity roller conveyor is used, and in the illustration the last section, which carries the cement into the house, is shown removed. Sand and stone are received in bottom dump cars dropped from a trestle and are carried to the bin by a motor-driven belt conveyor.

Another illustration shows what is commonly known as the "Chicago caisson" method of foundation. This view is a rather unusual one, as ordinarily these caissons are completely concealed in the earth, but in this particular case a change in plans after they had been sunk resulted in their being exposed by a steam shovel.

Practically all of the excavated material is disposed of by means of the Chicago tunnels. The excavated material is shot into cars of this narrow gage underground railway for disposal on the Lake front. At the Union Station the tunnel was widened sufficiently to allow a siding to be built.

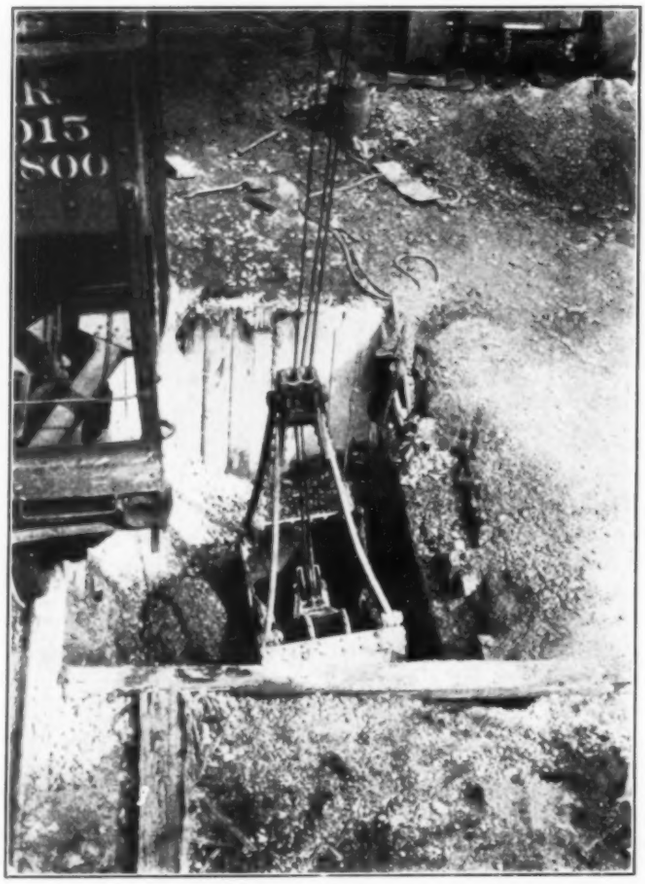
Graham, Anderson, Probst & White are the architects and engineers. The Wieboldt Construction Co. has the general contract on the above described portion.

SEVEN TYPICAL "CHICAGO CAISSONS" EXPOSED BY SUB-BASEMENT EXCAVATION.

TWO SETS OF TRUCKS ON PAVING JOB

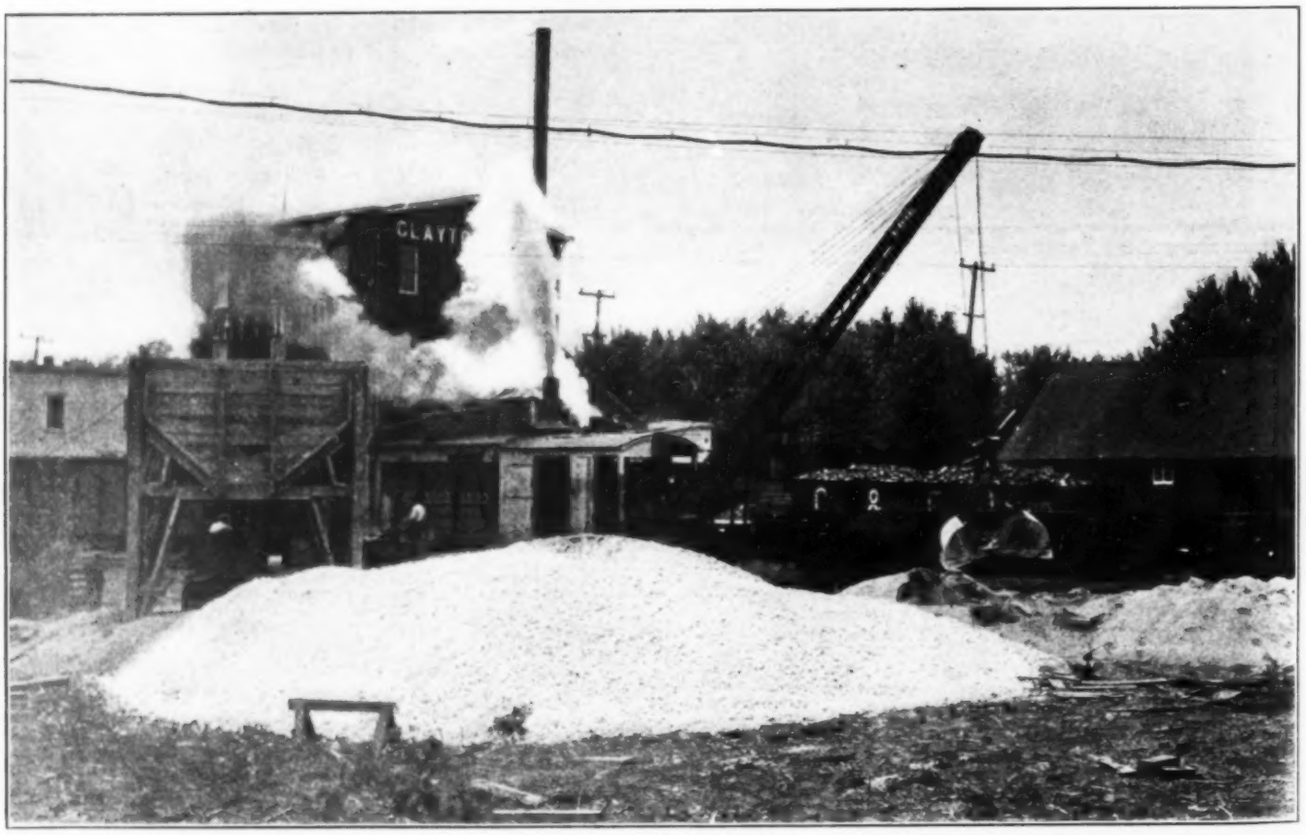
OF the 60 miles of concrete road under construction on the National Road in Indiana during 1922, the Williams & Little Company of Cleveland Heights, Ohio, had contracts for over 21 miles. One job was located east of Indianapolis, while the other—practically 14 miles in length—was situated in Hendricks County, west of the State capital. On the latter section the contractor made remarkably quick progress. The high run was 711 lin. ft. of 18-ft. road laid in 10 hours.

The hauling equipment on this section included both five-ton and one-ton trucks, an unusual combination. The heavy trucks carried materials from the several unloading points on the Pennsylvania Railroad over the gravel roads of the

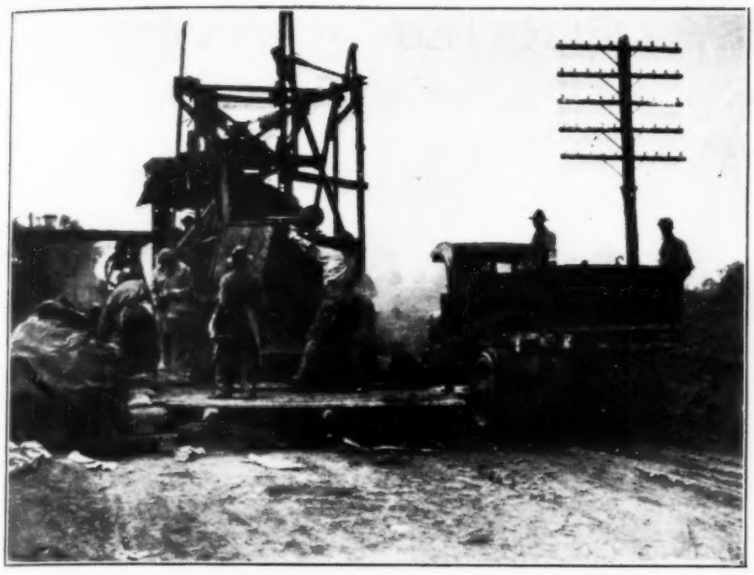


county to the mixer, while the light ones hauled mixed concrete a few hundred feet from the mixer to the end of the slab. Because of the weight of the large trucks, the engineers of the State Highway Commission refused to allow them to use the prepared subgrade. Therefore it was decided to block up the paver at intervals of about 1500 ft. and to carry the mixed concrete in four small trucks equipped with V-shaped end-dump bodies. A light steel turntable was provided at the pavement end, but at the mixer the trucks merely turned on the subgrade.

Nine of the big trucks made up the fleet hauling sand and crushed stone. Enough of each material for a six-sack batch of 1:2:3 concrete



THE WELL-EQUIPPED UNLOADING PLANT. THE UPPER PHOTOGRAPH SHOWS THE PIT USED FOR UNLOADING THE AGGREGATES



HEAVY TRUCK BRINGING AGGREGATES TO MIXER

was taken on at the loading plant in each of the three tipover steel boxes that a truck carried. Cement was hauled by sub-contract, also on large trucks, and delivered upon a platform at the mixer.

Since the National Road roughly parallels the Pennsylvania Railroad, sidings for the material yard were available at two to three-mile intervals. Aggregates were handled by a steam shovel fitted with a 36-ft. boom and a ¾-yd. clam-shell bucket. As much of the material was received in bottom-dump cars, a pit 9 ft. wide by 12 ft. long by 8 ft. deep was excavated along the track and lined with sheeting. When aggregates were dumped into this pit, the clam-shell could always pick up a full load and made much better progress than when unloading a car direct. Half an hour was long enough for unloading a 50-ton car via the pit. Dump gondolas were moved by a truck, while the flat bottom cars were pinched ahead as desired. The shovel had only a 20-ft. platform on which to move, so that cars had to be spotted for unloading. Two men operated the shovel, and one or two worked in the car.

Portable wooden bins of 65 cu. yd. capacity were used in loading batch-boxes. The stone bin occupied 2/3 of the space and the sand bin 1/3. Each bin had three steel gates set properly for loading the three boxes carried by each truck. One man operated these gates.

The section of 7¼ miles east of Indianapolis was finished late in September and the other was finished at the end of the season. Following its policy of taking core drill samples to determine the thickness of pavement actually constructed, the Indiana State Highway Department took a number of such samples from these pavements. The specified thickness in this case was 6 in. at the sides and 8 at the center.

LIGHT TRUCK TAKING MIXED CONCRETE TO END OF SLAB

For the State Highway Department, T. B. McMath was Project Engineer at the time this article was written. C. Gray is State Highway Engineer, and Charles Zeigler is Chairman of the Commission.

ROAD SHOW LIKELY TO BREAK RECORDS

THE Convention and Road Show to be held in Chicago January 15 to 19 are attracting the attention of men all over the country who are interested in construction and maintenance of highways, and there is every indication that this year's convention and show will surpass their predecessors in every respect.

In last month's issue of Successful Methods the complete program of the convention was printed, and any one who refers to it will see at once the great and interesting variety of subjects that will be presented and discussed.

As stated before, the convention this year will be held in the Congress Hotel. It will be the Twentieth Annual Convention of the American Road Builders' Association, the organization that has done so much for the cause of good roads in the United States.

The road show to be held in the Coliseum in connection with the Convention will bring together a notable collection of road building machinery of all kinds. The contractor or engineer who wishes to keep thoroughly up-to-date so far as the mechanics of road construction is concerned can do so by visiting the Road Show.

In addition to the Convention at the Congress and the Show at the Coliseum, various other attractions have been provided for those in attendance.

AN ELECTRICALLY OPERATED QUARRY

Steam Engine Hauls Cars Now but Will Lose Its Job in Spring

By Gordon P. Gleason

ELECTRICAL equipment is one of the principal features in the operation of The Norton Stone and Lime Corporation's quarry at Cobleskill N. Y. This equipment, which has been in use at the plant and quarry pit since 1911, will soon be enlarged. By the addition of three more electric shovels and the construction of an electric railway, the plant will hold the unusual position of being a 100 per cent electrical quarry.

The Norton Quarry, as it is locally called, is not only one of the most extensive limestone deposits in the country, but it is now producing a considerable quantity of lime rock, a commodity that is extensively utilized for refertilization projects. In addition to this,

VIEW OF QUARRY PIT—EARTH TAKEN FROM LIMESTONE IN SHIPPING OPERATIONS IS DEPOSITED AT ONE END OF PIT

the quarry now produces from between 100,000 and 150,000 tons of crushed stone that is used for road building, concrete work and railroad ballast. With the addition of the three electric shovels and the installation of the electric railway, the work at the quarry will be speeded up, and it is estimated that a total of 400,000 tons of crushed stone and 50,000 tons of lime rock will be the maximum capacity of the quarry.

The crushing plant consists of a large building, similar in design to a grain elevator. At one side of this are a number of cabins which house the laborers, while a spur line railroad runs direct to the crushing plant from the Delaware and Hudson Railroad tracks. Every operation, both in the quarry and at the crushing plant, with the single exception of the rail line used to bring the rock from the quarry to the crusher, is electrical, the current being supplied from a hydro-electric station located at Garoga Lake, 22 miles away.

Under the plan of operation followed by the Norton company, the earth strata over the limestone deposit is stripped by means of a tractor-type electric shovel with a bucket capacity of 3 tons. As the earth is removed the drilling machines are set at work preparing the drills for the blast, a total of 50,000 tons of stone being blown out at every blast. In the quarry pit this rock is broken into smaller pieces by blasts, and the stone is then scooped up by electric shovels and loaded into side-dump cars of 5-ton capacity. The track accommodating these cars is standard-gage, and, although steam locomotives are now used, an electrical system will probably be in operation by next spring.

The crusher arrangement consists of three breakers or crushers, the primary breaker being of the gyratory type, having a capacity of 5 tons per minute. The track from the quarry curves around so as to form a circuit with one side parallel to the battery of crushers. The cars are then side-dumped into the center breaker and the rock crushed, after which it is taken up by means of a belt conveyor and elevated to the main cupola of the plant, where it is automatically dumped into a series of cylindrical screens, which grade the stone into various sizes and deposit it in hoppers. Rock that is too coarse to pass through the screens is re-crushed and re-elevated to the screens.

An efficient method of loading and disposing of the railroad cars is in operation. The empty cars are taken up a gradual grade by railroad locomotives and left on a two-track siding. When they are needed for loading they are brought down grade to a position under the crushing plant, where they are loaded direct from the hoppers that have been installed to hold the various sizes of crushed stone. As the cars are filled they are released and run by gravity down to the main spur line, where the passing freight train picks them up.

The officers of the Norton Stone and Lime Corporation are: A. L. Norton of Cobleskill, president; Frank M. Williams, Albany, vice-president; Roy G. Finch, Albany, secretary, and H. L. George, Albany, treasurer.

AT THE NORTON QUARRY, SHOWING DUMP CARS, ELECTRIC SHOVELS AND DRILLING MACHINES

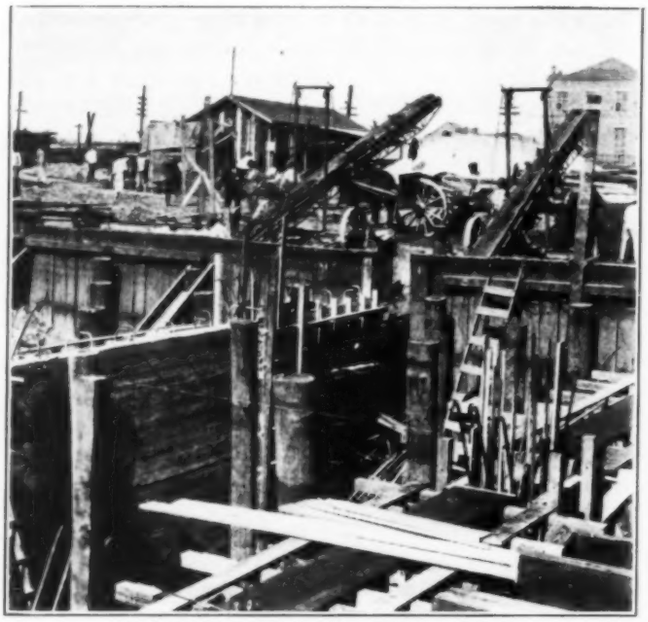
CONVEYORS WORK IN CLOSE QUARTERS

Vagaries of Mississippi Make Trouble for New Orleans Dock Board

By D. B. Frisbie

THE City of New Orleans has a double problem. It must have a levee and it must have docks. The most important city commission today is the Dock Board, for upon its initiative rests the commercial prosperity of the port, and upon its caution depends the safety of the city. Canal Street, the Broadway of New Orleans, is normally 6 ft. below the level of the river, but nothing under 20 ft. is considered really dangerous.

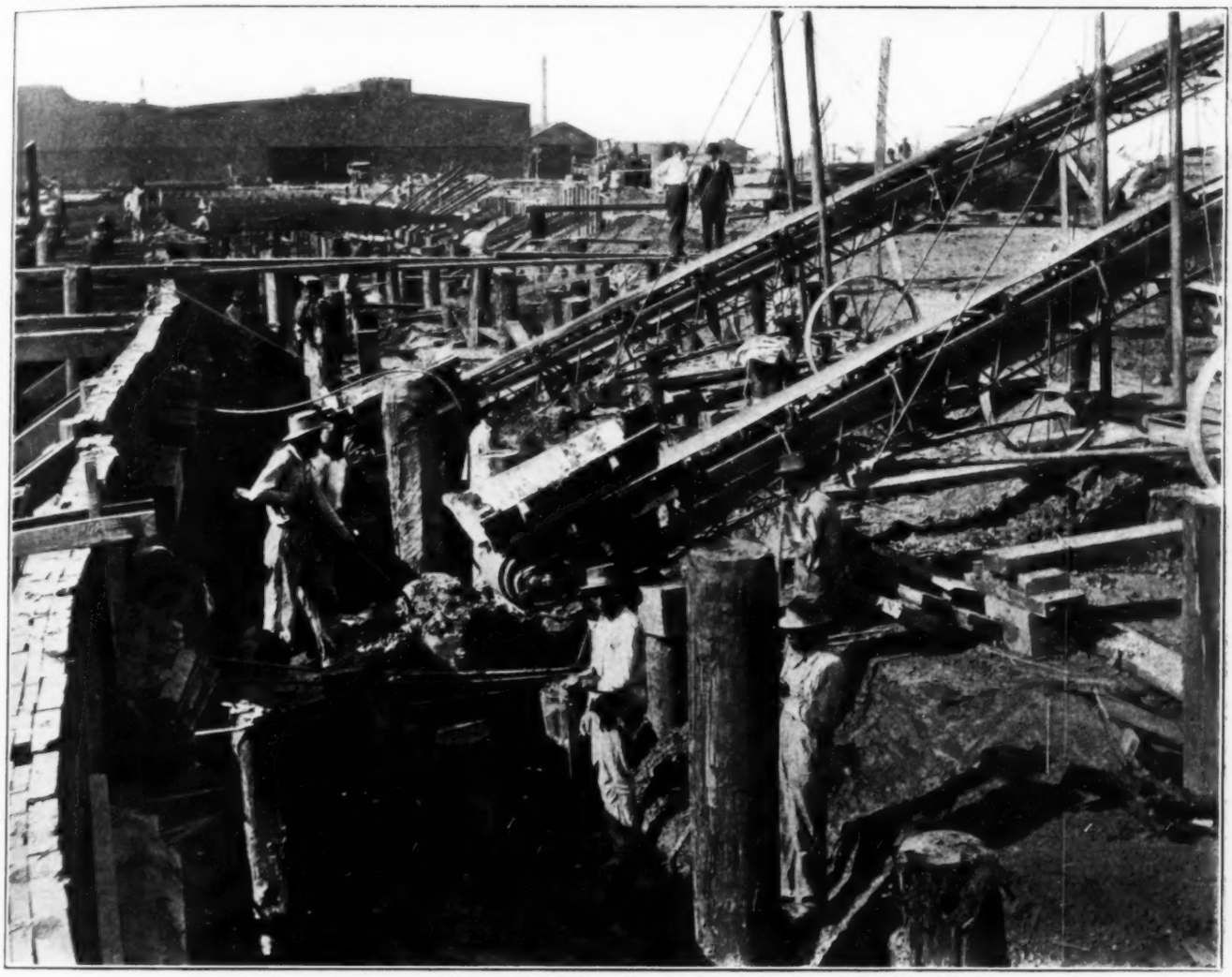
The Dock Board engineers therefore must and do exert far-seeing and never-ending vigilance. They must protect some 30 miles of dockage and warehouses built upon the levee, not only from the waters, but from fire and rats. As fast as appropriations will permit all the old wooden timber structures are being torn down and replaced with concrete and steel.



CONVEYORS LOADING MULE CARTS

One such job—the Louisiana Street Dock—is nearing completion now as shown by the pictures accompanying this article. This job was undertaken immediately after last season's high water when it was found

A GENERAL VIEW OF THE RECONSTRUCTION WORK LOOKING DOWNSTREAM



THE SHOVELERS AT WORK IN CLOSE QUARTERS FEEDING THE CONVEYORS

that the levee under and behind the dock had begun to slip and was forcing the old piling out into the river. To relieve this pressure dirt was removed to a depth of 13 ft. for 50 ft. back and a new reinforced concrete wall put in. Piling had to be driven in this removal area first to stay the upward thrust of mud and water which would result from the pressure of the river on one side and the levee on the other.

The removal of the dirt then was no easy task, for the piling was necessarily so closely spaced that a shovel dipper or clam shell was out of the question and even a hand shoveler was handicapped for elbow room. The job was considerably facilitated by the use of portable belt conveyors placed with their receiving hoppers down in the excavation, reaching out and up to discharge into mule carts. Each conveyor kept six shovelers busy. The same conveyors had been used to unload from cars and pile up the crushed stone shown in the right background of the smaller photograph on the opposite page, and had also unloaded 6000 bags of cement from a barge in the surprising time of 4½ hr.

As fast as each section of the excavation is completed the back retaining wall is poured and the cross partition walls brought into it. The floor beams, flooring and steel superstructure follow.

A total of 4½ miles of similar work has been scheduled and detailed for 1923 program. Part will presumably be contracted and part done by the Dock Board's own construction department.

JERSEYMEN TO RIDE ON WASSER SPECIAL

The members of the New Jersey Road Builders' Association will go to the Road Show in Chicago this year in a special train, which has been christened the "Thomas J. Wasser Special," in honor of the State Highway Engineer of New Jersey, who is also president of the American Road Builders' Association. The special train, which will run over the Pennsylvania Railroad, will leave New York City on Sunday, Jan. 14. The Jerseymen will be glad to welcome any other visitors to the Convention on the "Wasser Special." Applications for reservations should be made to Al Barrett, American Mechanics' Building, Trenton, N. J.

PROTECTING THE SUBGRADE

Materials for Pavement Base Wheeled Across Street Car Tracks on Board Runways

By Ivan E. Houk, City Engineer, Dayton, Ohio

PAVING contractors can appreciate the advantages gained by keeping heavy delivery trucks off the subgrade when supplying sand and gravel for the concrete base. Ordinarily it is necessary to back the trucks in over the subgrade after the fine grading and rolling has been done, which in most cases results in cutting up the pavement foundation and consequently requiring additional labor in reshaping the surface before the concrete can be poured.

SUBGRADE LEFT CLEAR BY DUMPING MATERIALS ON OPPOSITE SIDE OF STREET

On the North Main Street repaving work in Dayton, Ohio, the contractor, Clifton Hoolihan, through co-operation with the People's Railway Company, was able to bring the sand and gravel within wheelbarrow reach of the concrete mixer without touching the subgrade. Only half the street could be torn up at a time inasmuch as this is one of the heaviest traveled thoroughfares in the city. Consequently it was possible to haul the material in on the side open to traffic and to dump it along the curb in the space where automobiles would otherwise have been parked.

It then was loaded on wheelbarrows in the usual manner, wheeled across the paved side of the street, and then across the unpaved street car track on board runways made of 2-in. plank. Two runways were used, one to wheel the materials to the mixer, the other to bring back the empty wheelbarrows. The runways were simply lifted up and moved ahead whenever the mixer was moved. The ends of the runways in the space between the two car tracks were kept 10 in. away from the rail of the track on which cars were being operated so as not to interfere with the movement of the cars. A sufficient width of roadway to permit the passage of one-way traffic was at all times kept open on the side not torn up.

This method of handling the materials, besides avoiding the cutting up of the subgrade, had the advantage of allowing materials to be brought to the job any time, rain or shine, thus eliminating the delays caused when the subgrade is too wet to permit the passage of trucks. The fact that more men could be used on the wheelbarrows was another advantage. As the shoulder being paved is only about 13 ft. wide, it was not feasible to use more than 5 men on the wheelbarrows when the materials were dumped on the subgrade. When wheeling from the opposite side of the street it was possible to use 8 men. In the portion of the street on which the latter method was used an average day's run was about 250 ft., whereas, in the section where the materials were dumped on the subgrade, the maximum day's run was only about 190 ft. and the cooperation between the contractor and the street car company made this advantage possible. However, the real saving to the job was in the protection of the subgrade. It was not necessary to do any work whatever on the subgrade from the time it was rolled until the concrete was poured.

WHEELING MATERIALS ACROSS CAR TRACKS ON WOODEN RUNWAYS

ADJUSTABLE SHORES ON THE GRANT PARK STADIUM, CHICAGO

THE illustration shows hand drilling going on under the Blome-Sinek Co., contractors on the $3,000,000 reinforced concrete stadium now being built in Grant Park, Chicago, devised and in use on the form work.

As there is not a piece of structural steel in the entire structure, and as the deck varies in height from 0 to 49 ft., the question of supporting the forms was an important one. The photograph shows the shore in place and how they are adjusted. Wedges are placed at the base to take up any slack. The shores have a range of from 8 ft. to 16 ft. A. E. Hadlow is superintendent for the contractors.

SUBMARINE DRILLING

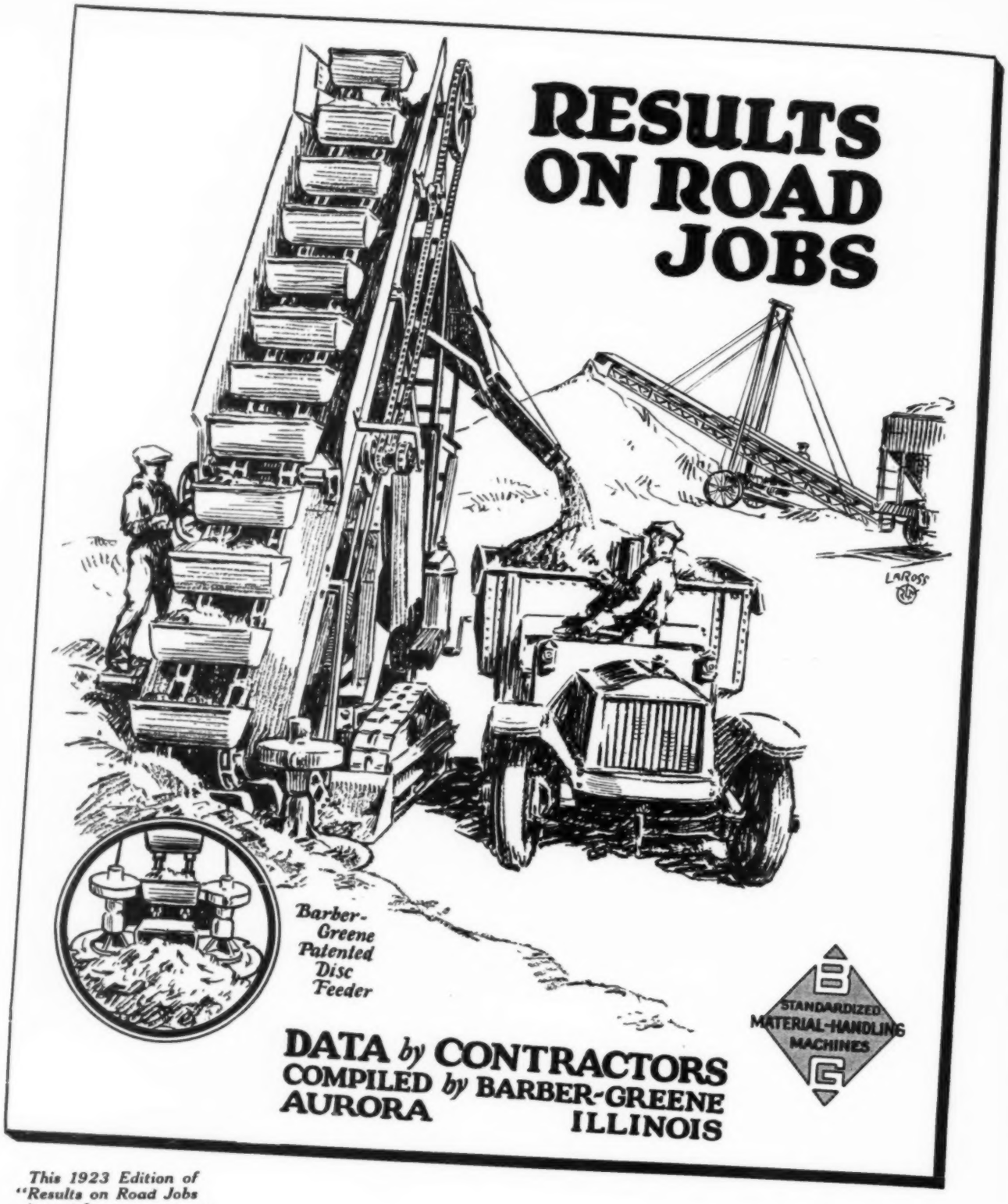
THE illustration at the top of the next column shows hand drilling going on under water preparatory to blasting. While this class of work is one of the most dangerous with which the explosive man has to contend, it is being done as the picture shows. The H. W. Nelson Co. is using 8 drills run by a 600-ft. gasoline driven air compressor in connection with their contract for widening and deepening the Little River between Huntington and Fort Wayne, Ind.

FEEDING THE MIXER

JOSEPH Dimando, road contractor of Mamaroneck, N. Y., is building the Knollwood-Hawthorne road in Westchester County. The illustration shows how he is stock-piling on the subgrade. In the foreground

may be seen a satisfactory if primitive method of transporting cement.

A mechanical loader is used to load 1-ton trucks equipped with dump bodies which shuttle back and forth from the loader to the mixer. At the time the picture was taken this distance of about 100 ft. This method of feeding the mixer worked well and the supply of materials was kept constant and the mixer busy.



This 1923 Edition of "Results on Road Jobs is sent free on request."

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Do You Know These Contractors and Their Jobs?

Every one of them has worked out interesting ways of speeding up material handling

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Chapman & McCloud, Hillside, N. J.
Christhilf, Ensey & Firor, Baltimore, Md.
Cotton Company, Vancouver, B. C., Canada
DeKalb County, Sycamore, Ill.
H. G. Goelitz, Oak Park, Ill.
Hamilton Construction Co., Bartlesville, Okla.
Henkel Construction Co., Mason City, Ia.
Homberger & Wagar, Sandusky, O.
Henry W. Horst, Rock Island, Ill.
E. J. Inman, Ashtabula, O.
Liberty Engineering Co., Chicago, Ill.
List & Hallett, Kansas City, Mo.
Wm. C. Meneely, Frankfort, Ind.
Modern Construction Co., Fremont, O.
Moore Construction Co., Nashville, Tenn.
Orman Crushed Rock Co., Pueblo, Colo.
T. H. Riddle, New Brunswick, N. J.
Shea & Company, Hammond, Ind.
State of Illinois, Springfield, Ill.
Taggart Bros. & Tebbs, Cowley, Wyo.
Warren Bituminous Paving Co., Ontario, Can.
F. S. Wilson, Kittanning, Pa.

For the information of all road contractors, the companies listed on this page have detailed the essential facts about their methods of improving the handling of materials and lowering costs during 1922.

Their account of their methods, together with photographs and layout drawings, are published in the 1923 edition of "Results on Road Jobs."

In practically every case the maximum pour and the average pour are given, together with detailed figures covering the number of men and their distribution on the job, and the performance of the equipment used.

This book will be sent free of charge to any established contractor on receipt of the attached coupon.

Fill out the coupon today for this bird's-eye view of the 1922 material handling methods and their results.

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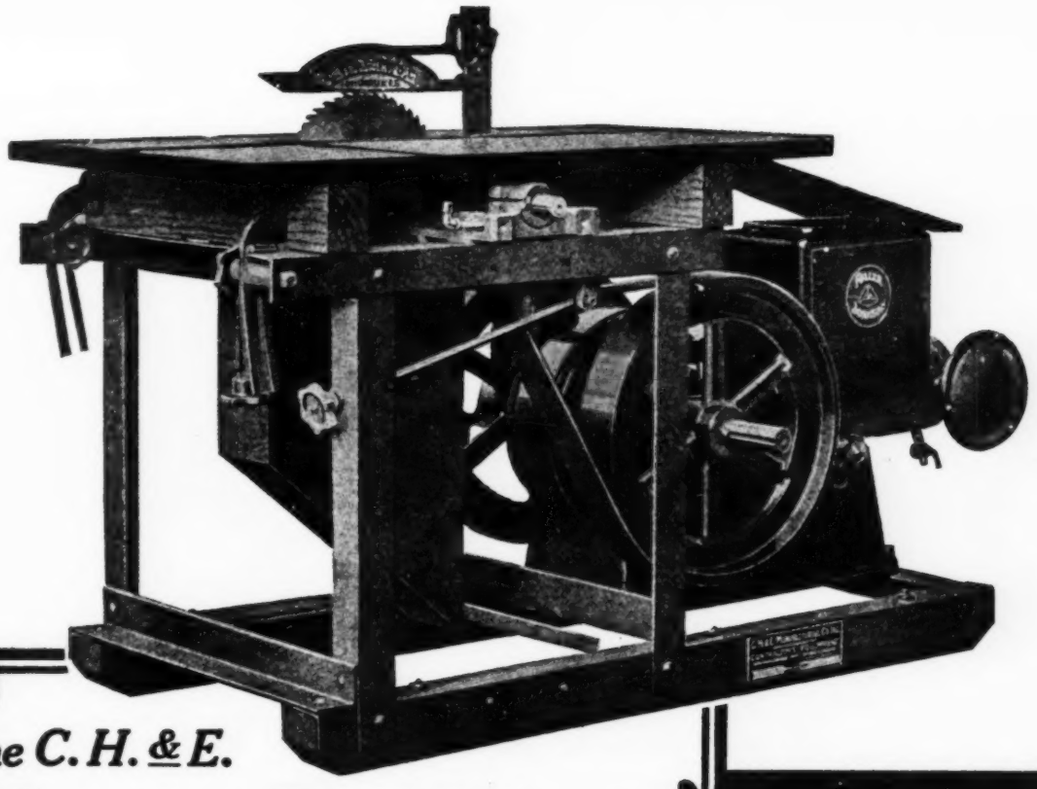

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The Three H. P. engine delivers ample power to rip 2-inch lumber. Total weight is 700 pounds.

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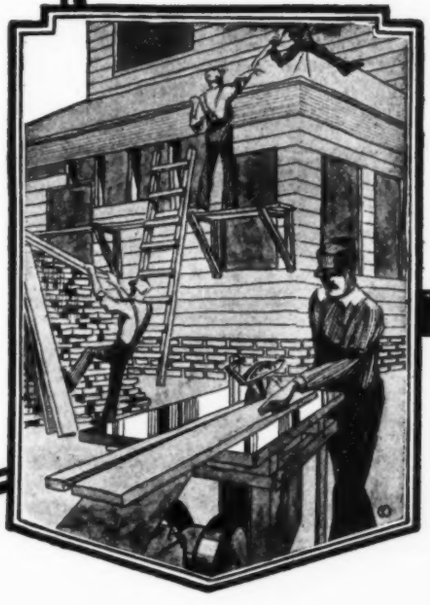

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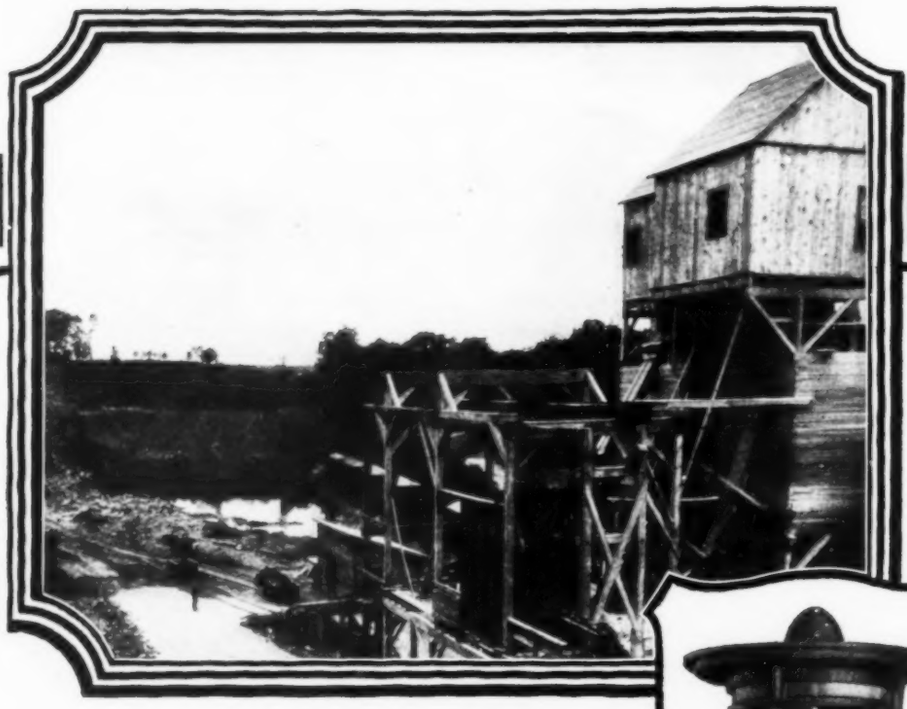

Cheap Stone
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Plenty of it

MARSHALL COUNTY, IOWA, SOLVED THE PROBLEM OF HOW AND WHERE TO SECURE CRUSHED STONE FOR ITS AMBITIOUS ROAD PROGRAM BY INSTALLING THE ABOVE-PICTURED PLANT IN A LONG-ABANDONED QUARRY. TWO AUSTIN GYRATORY CRUSHERS, A No. 7½ AND A No. 5, ARE TURNING OUT EXCELLENT MATERIAL AT A MUCH LOWER COST THAN IF IT HAD BEEN SECURED IN ANY OTHER MANNER.

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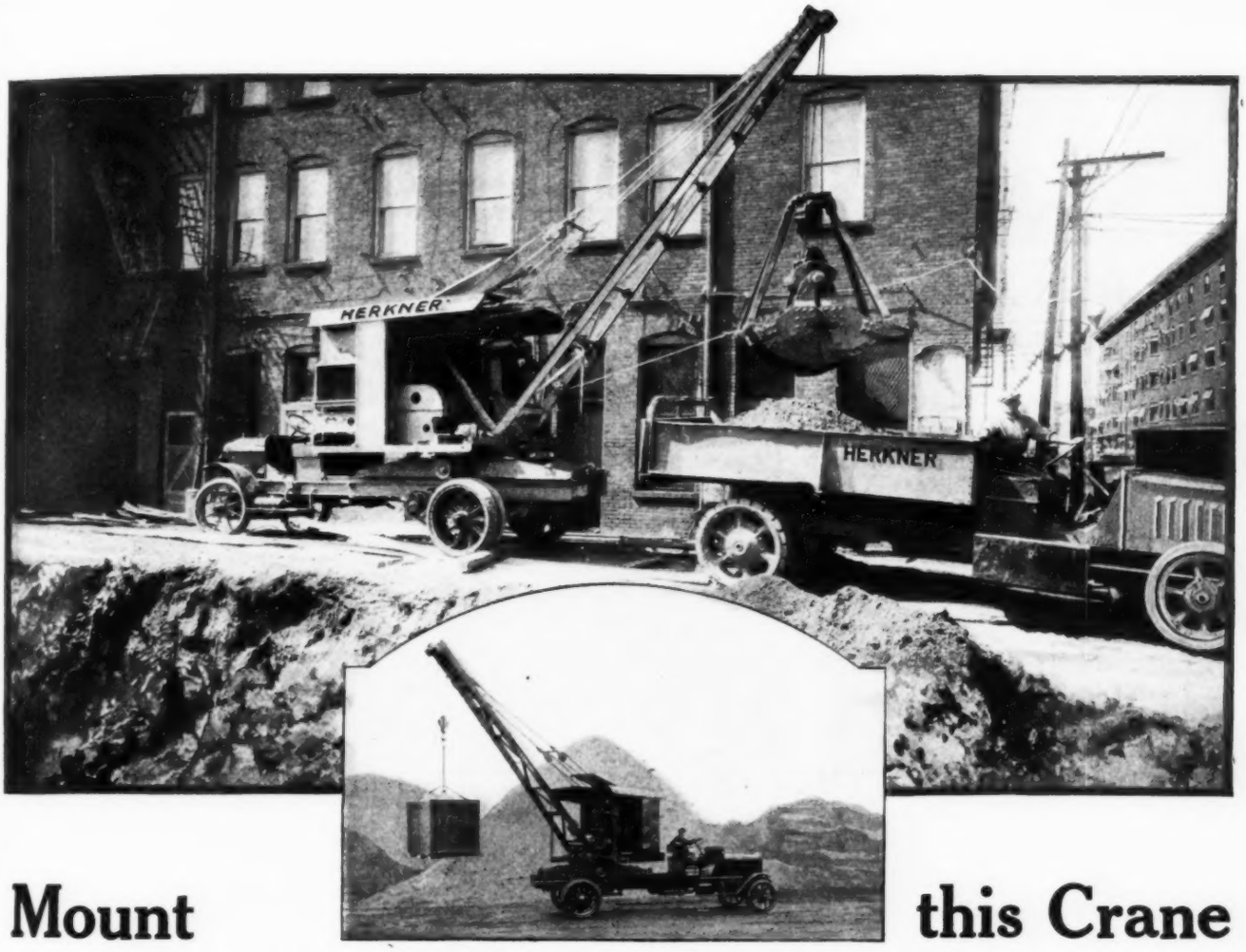

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No time is lost when the machine is to be moved to another job. The lower photograph shows the ease with which the crane can handle loaded batch boxes for concrete work.

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1. The ability to get from job to job at *Motor Truck Speed.*
2. The stability. (Center of Gravity lower than a loaded 5-ton dump truck.)
3. No outriggers necessary—permitting travel with load.
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Spring Mounted Yard Trucks; R. R. Flatcar Carriage—Movable or Fixed; Continuous Tread, Etc.

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Coliseum—Chicago, January 15-19, 1923

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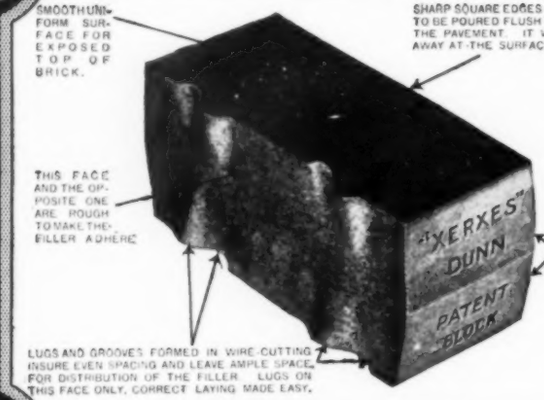
WIRE-CUT LUG BRICK

A Wire-Cut Lug Hillside Brick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End View—Two Wire-Cut Lug Brick—Note joint spacing

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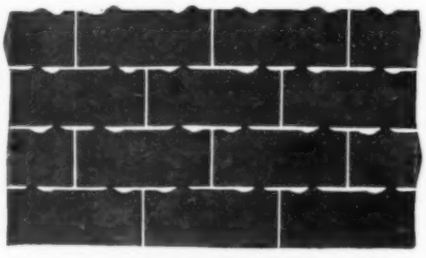

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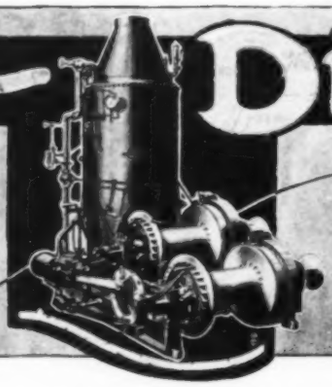

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E. D. Morton & Co.,
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Edelen & Boyer Co.,
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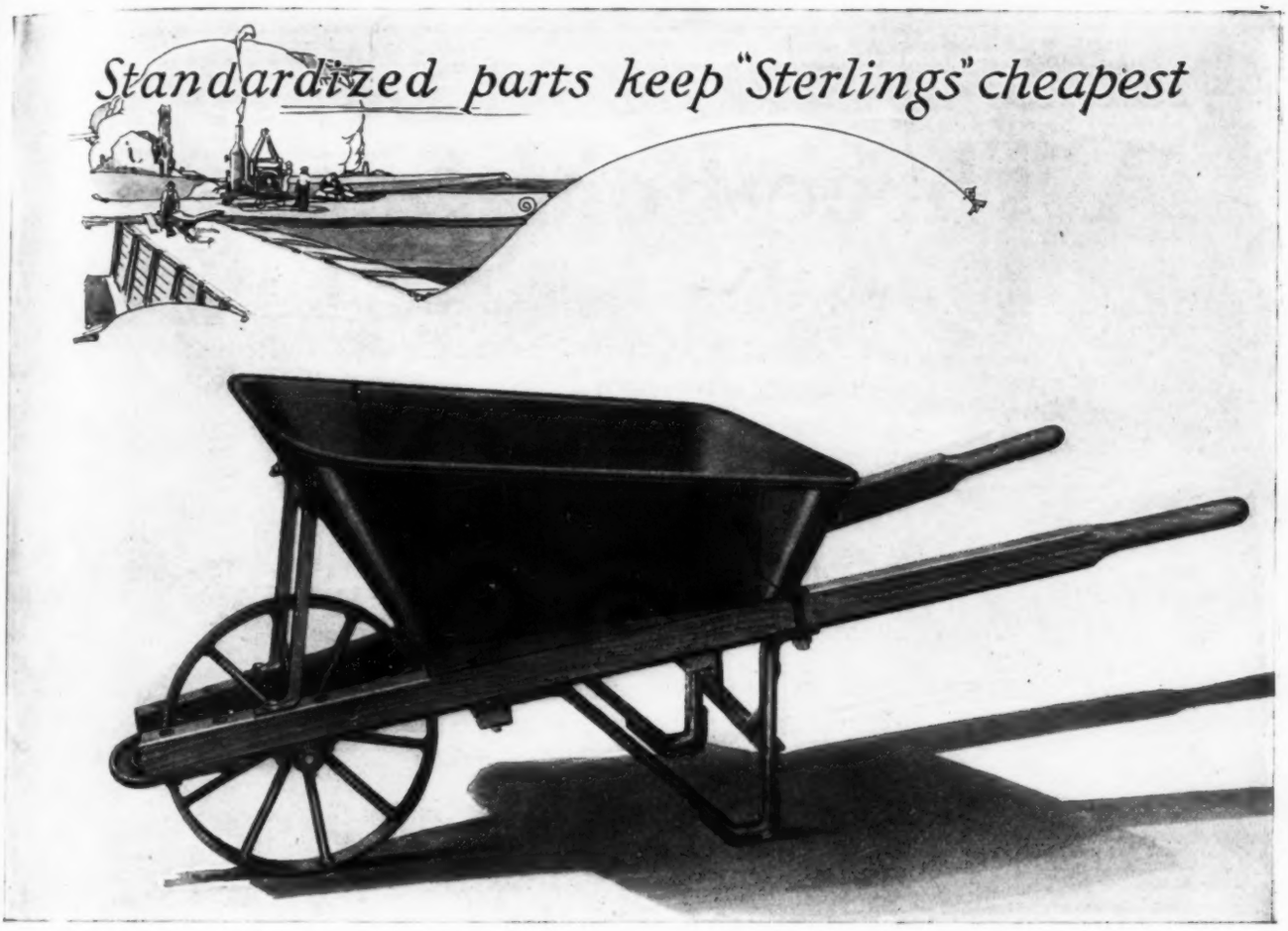

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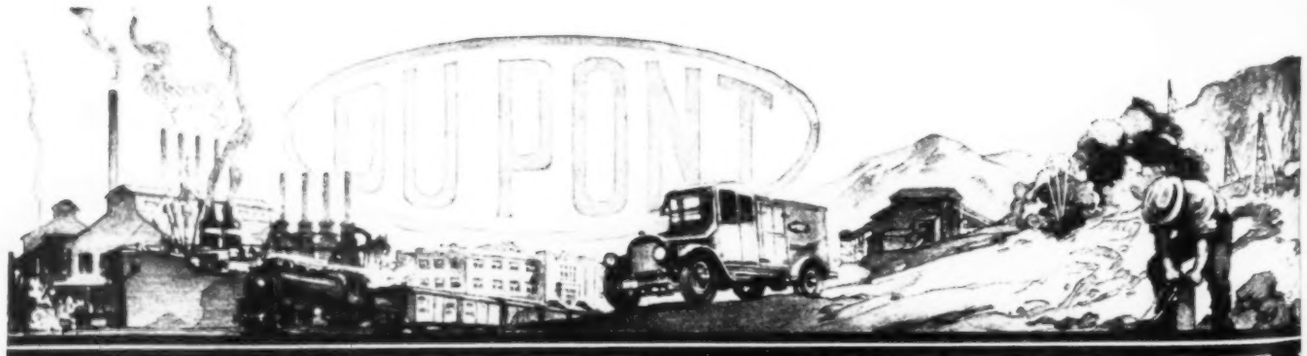

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